Operating Instructions

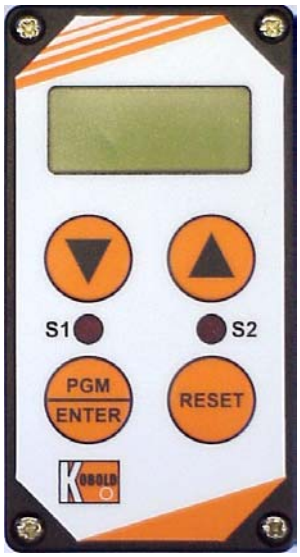
for

Counter Electronic

Model: ZED-Z

or DF-…ZLxxx

or *Model*-…ExxR



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2. Note

Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.
The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfil the EWG-machine guidelines.

3. Instrument Inspection

Instruments are inspected before shipping and sent out in perfect condition.
Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

Scope of delivery:
The standard delivery includes:

- Counter Electronic model: ZED-Z or flowmeter incl. Counter Electronic
- Operating Instructions

4. Regulation Use

Any use of the Counter Electronic, model: ZED-Z, which exceeds the manufacturer's specification may invalidate its warranty. Therefore, any resulting damage is not the responsibility of the manufacturer. The user assumes all risk for such usage.

5. Operating Principle

The evaluation unit changes the frequency signal of the pickup into a 3(4)-digit flow reading with selectable measurement unit (top display line), and into a scalable analogue signal. The flow quantity is added up in a part quantity meter and a total quantity meter and then displayed in the bottom line of the screen. The quantity meter's units of measurement are selectable.
The two relays with floating output changeover contacts continuously monitor if the freely adjustable limits are exceeded or fallen short of. Here, it is possible to choose between threshold value and window monitoring.

Switching point, hysteresis, a window point, and switch on or off delay can be set separately for each relay. The switching points can also be set directly by using the control keys without having to change over into the menu. Alternatively, it is also possible to monitor the quantity meter to see if it is exceeded. A red LED indicates with the switching status.

The analogue output is optionally available as current output with 0(4)...20 mA or as voltage output with 0...10 V. The Parameter names can be shown in the menu in German or English. If used where the flow readings change rapidly, the display can be pacified and the analogue reading averaged by switching on some software. When using analogue output 0 – 10 V the customer must put a jumper between the terminals 7 and 8.

A MIN/MAX reading memory determines the extreme readings of the flow. The display of the readings and the resetting are achieved by using the keys without having to change into the menu. Resetting by using the keys can also be blocked. If the maximum set flow (exceeded range) is exceeded, it will be shown on the display.

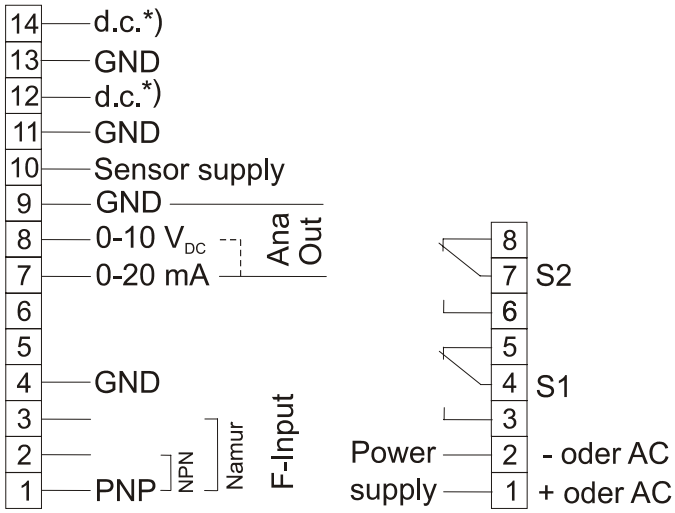
The set parameters can be protected against unauthorized alteration by using a password function.

Range of functions

Quantity meter and flow meter with digital display, switch and analogue output:
- Measurement and display total, part and flow quantities
- Free scaling using input of frequency and measured value
- Control input for part quantity reset
- 2 switching outputs, freely programmable as flow monitor or for monitoring the part and total quantity
- Analogue output 0(4)-20 mA oder 0-10 V
- MIN/MAX memory

6. Electrical Connection

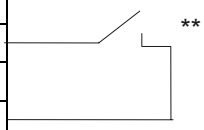
6.1 ZED-Z, DRB-…ExxR, DPE-…ExxR field housing and control panel installation



*) Don't connect terminal!
**) Reset TM – GND => reset part quantity counter

6.2 DF-…ZLxxx, Model-…ExxR cable connection

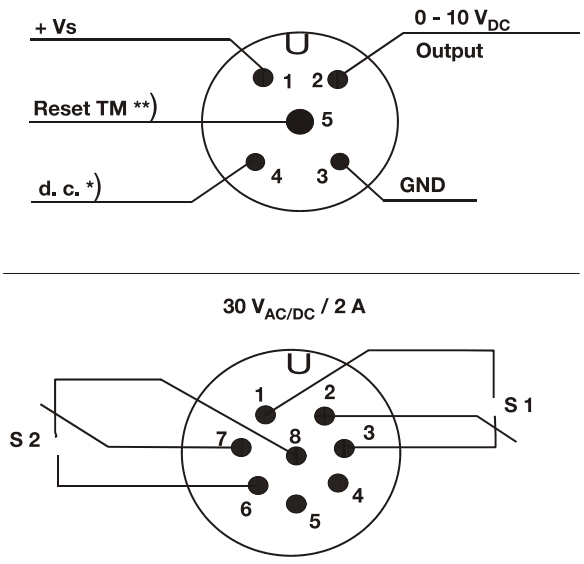
Wire number	ZED-Counter electronics
1	+24 V_{DC}
2	GND
3	4-20 mA / 0-10 V
4	GND
5	d.c. *)
6	Reset TM
7	Relay S1 N/O
8	Relay S1 COM
9	Relay S2 N/O
10	Relay S2 COM



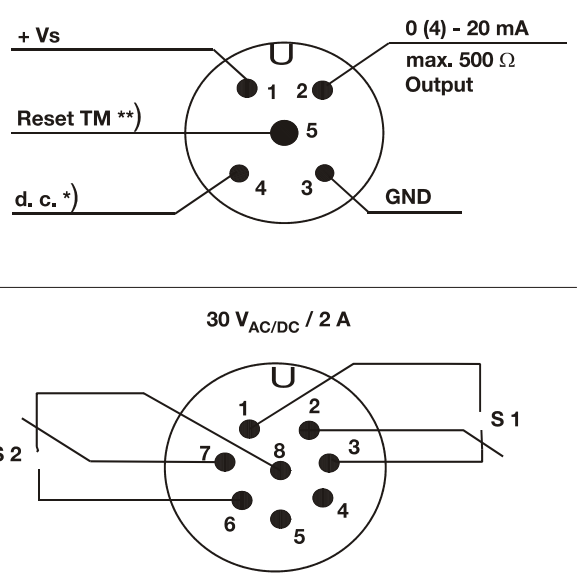
*) Don't connect terminal!
**) Reset TM – GND => reset part quantity counter

6.3 Model-…ExxR
cable connection + plug connection

-E31 R



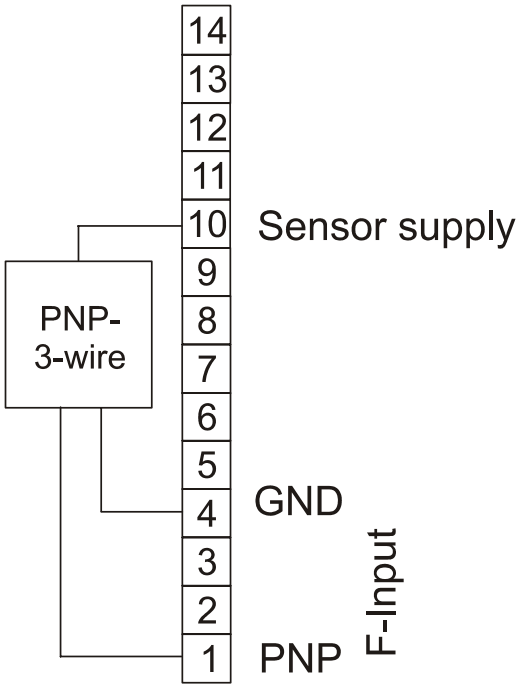
-E34 R



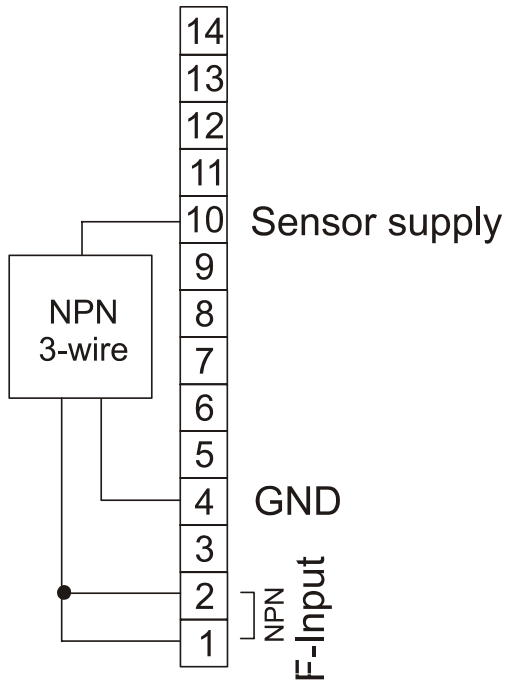
*) Don't connect contact !
**) Reset TM – GND => reset part quantity counter

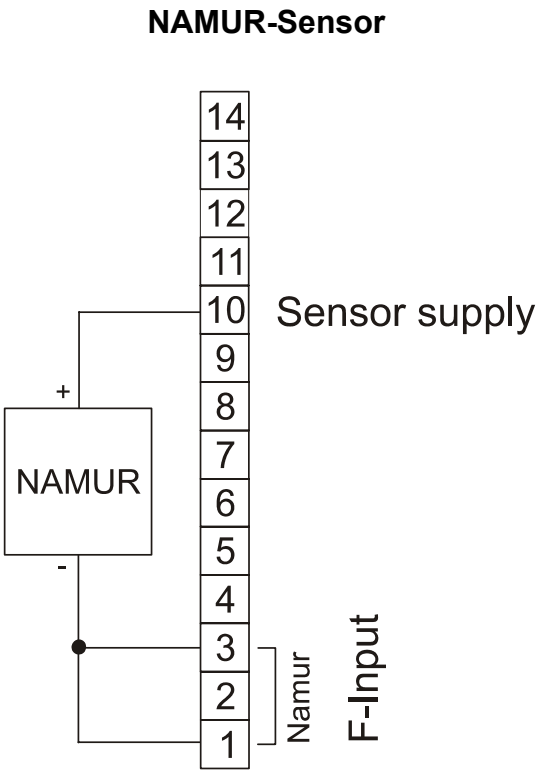
6.4 Connection example

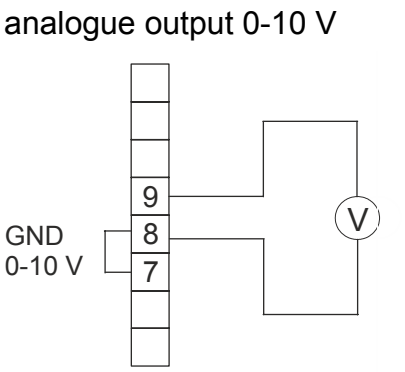
PNP-Sensor

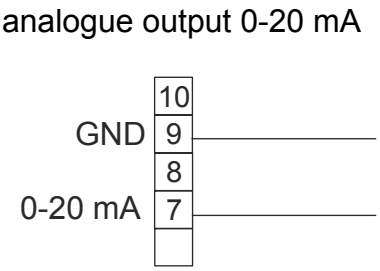


NPN-Sensor









7. Operation / Configuration / Adjustments

7.1 General

Only the menu items which lines are marked in the selection matrix in grey colour, are available in the respective instrument version.

***Italic* written values are blinking in the display, if they have been chosen for any input.**

The parameter can only be changed, if the security code has been entered correctly! The message „locked“ will appear if the input has not been activated.

7.2 Function of the control keys

Operating mode >Measure< :

PGM/ENTER

- Press briefly: → a) Display total quantity, then
  Display corresponding scale unit or
  → b) Reset status reports.

- Press for 3 sec: → Switch to operating mode >**Parameterize**<.

▼

- - Press briefly: → Display min. flow value.

- Press for 3 sec: → Enter switching point for Relay S1 **s1SPoint**
  (only if parameter **SPdirect** is set to **"yes"**).

.

▲

- - Press briefly: → Display max. flow value.

- Press for 3 sec: → Enter switching point for Relay S2 **s2SPoint**
  (only when parameter **SPdirect** is switched to **"yes"**).

▼ + ▲

Press for 3 sec: → Sets min. and max. value memory to flow value
(only when parameter **fMMReDir** is switched to **"yes"**).

RESET

- Press for 3 sec: → Sets the part quantity counter to 0.

Operating mode >Parameterize<:

PGM/ENTER

- Press briefly: → a) Open parameter group or
  → b) Change parameter (go lower in menu level) or
  → c) Adopt value input.

- Press for 3 sec: → Abort input (ESC) and go back one menu level.

▼

- Press briefly: → a) Select parameter group or parameter or
  → b) Reduce selected number by 1 or
  → c) Select list value (e.g.... L/m, L/h, m^3/m, ...).

▲

- Press briefly: → a) Select parameter group or parameter or
  → b) Increase selected number by 1 or
  → c) Select list value (e.g.... m^3/m, L/h, L/m, ...).

RESET

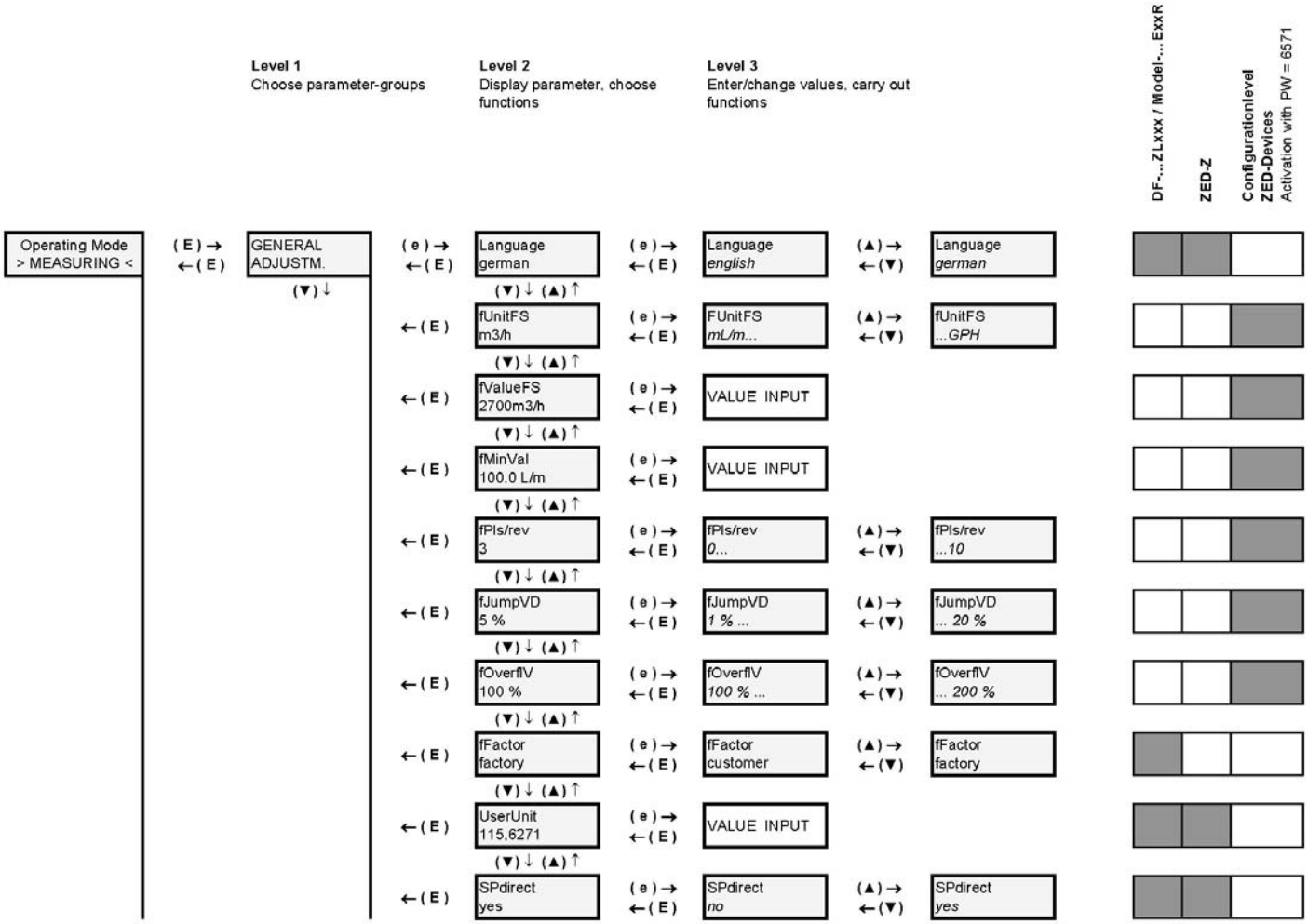
- No function in this mode.

Note: If no button is pressed for 20 seconds during parameterising, the instrument automatically switches back into >measuring< mode.

7.3 Character explanation for main menu

(**e**) - Button **PGM/ENTER** press shortly.
(**E**) - Button **PGM/ENTER** press and hold for approx. 3 seconds.
(▼) - Button ▼ press shortly.
(▲) - Button ▲ press shortly.

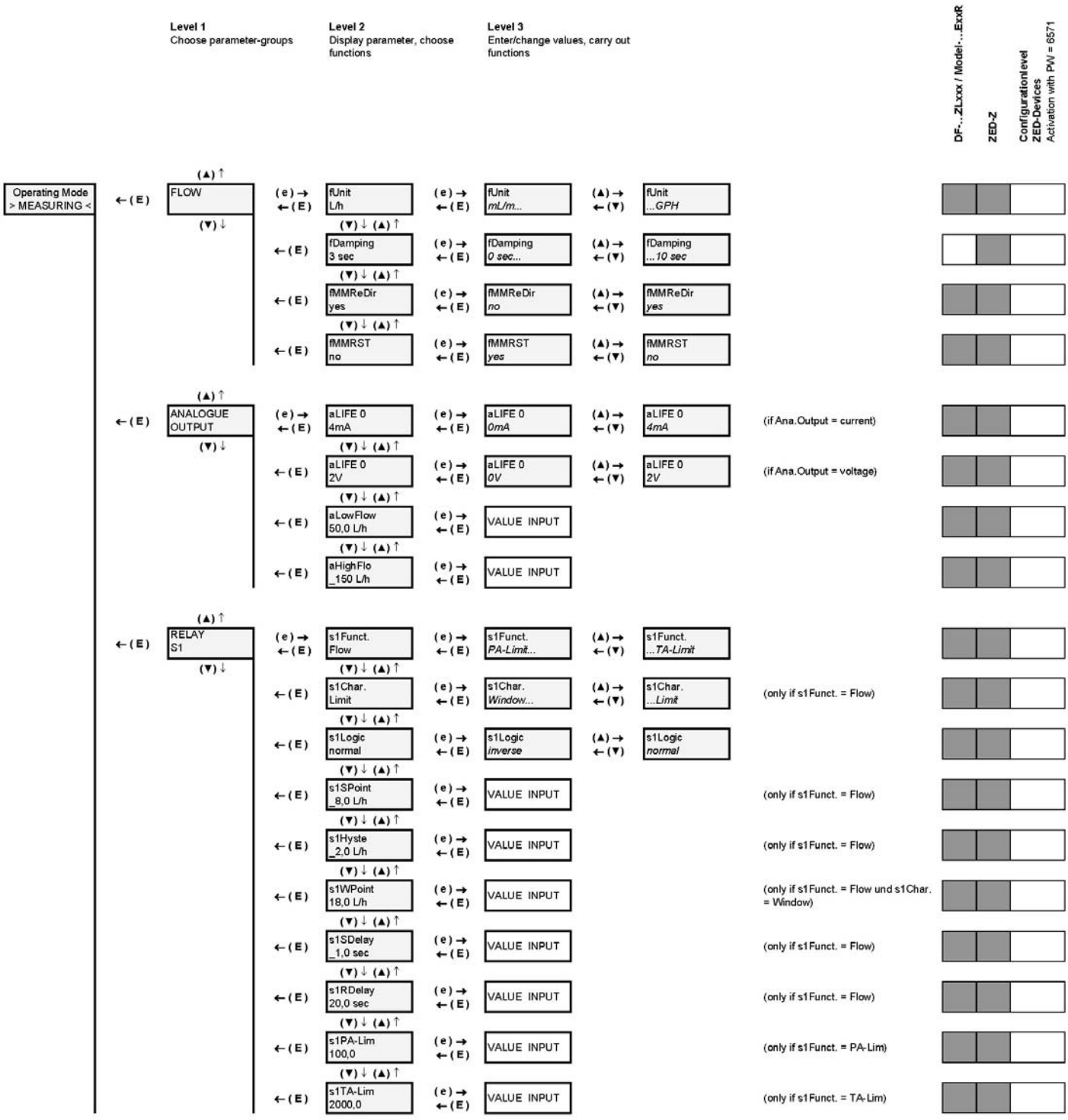
7.4 General Settings



GENERAL SETTINGS		
Menu Item	**Parameter / Function**	**Explanation / Values / Other**
Language	Select menu language	German or English
fUnitFS *	Measuring unit for flow measurement	mL/s, mL/m, L/s, L/m, L/h, m^3/m, m^3/h, GPM, GPH, UU/s, UU/m, UU/h
fValueFS *	Maximum measuring range value for flow measurement	Range = 0,00...99,9..._100...9999
fMinVal *	Minimum measuring range value for flow measurement	Basis is fValueFS and fUnitFS If the level drops below this, the flow indicator goes to 0.
fPls/rev*	Impulse per sensor wheel revolution	Number of impulses per revolution of the sensor wheel or the like Necessary for long-term period averaging if the readings per revolution vary. The function is switched off when the input value is 1.
fJumpVD*	Flow switch value for attenuation cut-off	Value in %, basis is fValueFS and fUnitFS. Attenuation does not function if the switch value is 0%.
fOverflV *	Flow overflow value (overflow)	Value in %, basis is fValueFS and fUnitFS. If exceeded, an M100 report is generated and faded in, alternating with the flow indicator. The report is saved and can be reset by briefly pressing the PGM key.
fFactor	Select pulse ration	Selection of works calibration or user calibration. (only for devices Model DF-...ZLxxx and Model-...ExxR)
UserUnit.	Special volume unit	Customer-specific special unit UU. The value entered corresponds to the number of litres of the special unit, e.g. in the case of the unit *Barrel* the factor would for example be 115.6271.
SPdirect	Activation of direct input switching point	yes: Direct input of switching points s1SPoint and s2SPoint is possible using the keys (default). no: The switching points can only be set in the menu .

*) Only for ZED devices: Device-specific parameter, is only visible after activation in the **SecCode** menu item in the **SERVICE** menu group, and can be changed.

7.5 Flow, analogue output and relay 1

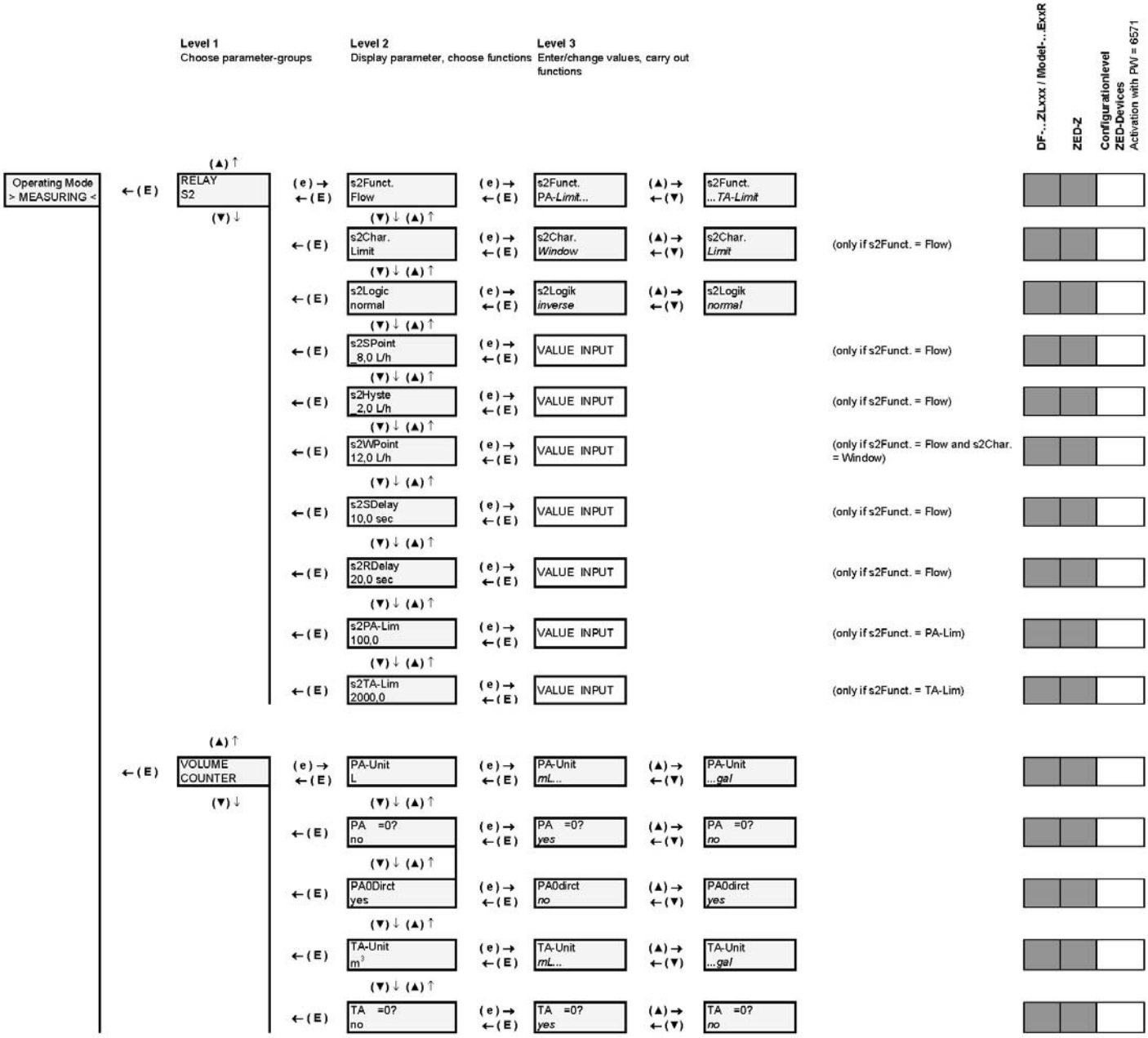


FLOW		
Menu Item	**Parameter / Function**	**Explanation / Values / Other**
fUnit	Unit of flow indicator	mL/s, mL/m, L/s, L/m, L/h, m^3/m, m^3/h, GPM, GPH, UU/s, UU/m, UU/h
fDamping	Attenuation of reading fluctuations in the flow indicator	The attenuation pacifies the flow indicator. The attenuation value is the approximate equivalent of the setting time of the display value to c. 90% of a measured value jump in seconds. (Parameter is blocked at DF-...ZLxxx devices).
fMMReDir	Resets the Min/Max flow value directly using the keys, without using the menu	yes: direct resetting of the Min/Max value memory by simultaneously pressing (3 sec) the (+) and (-) keys (default). no: memory reset only possible with fMMRST.
fMMRST	Resets the Min/Max flow value memory of the flow indicator	yes: Resets Min / Max value memory for the flow no: No action.

ANALOGUE OUTPUT		
Menu Item	**Parameter / Function**	**Explanation / Values / Other**
aLIFE 0	Select Life Zero	Offset at power output: 0 mA or 4 mA at 0-10 V ≙ 0 mA → 0 V and 4 mA → 2 V
aLowFlow	Flow reading at 0/4 mA or 0/2 V	Lower flow reading of gauged output range, value has the same unit as the flow indicator
aHighFlo	Flow reading at 20 mA or 10 V	Upper flow reading of gauged output range, value has the same unit as the flow indicator

RELAY S1		
Menu Item	**Parameter / Function**	**Explanation / Values / Other**
s1Funct.	Relay1 Function selection	Flow.: Monitoring of an adjustable flow value (s1SPoint). TA Limit: Monitoring of an adjustable total volume (s1TA-Lim). PA-Limit: Monitoring of an adjustable part volume (s1PA-Lim). see → 8.0 Relay functions
s1Char.	Relay1 Switch characteristic	Limit: Monitoring a reading (s1SPoint). Window: Monitoring an adjustable measuring range (s1SPoint...s1Fpunkt). (only if **s1Funct.** is set to **Flow**)
s1Logic	Relay1 Switch logic	normal: Relay 1 activated when the limit value is exceeded. invers: Relay 1 drops out when the limit value is exceeded.
s1SPoint	Relay1 Switchpoint	Reading is in the same units as the flow indicator. (only if **s1Funct.** is set to **Flow**)
s1Hyste	Relay1 Hysteresis	Reading is in the same units as the flow indicator. (only if **s1Funct.** is set to **Flow**)
s1FPoint	Relay1 Windowpoint	Reading is in the same units as the flow indicator. (only if **s1Funct.** is set to **Flow** und **s1Char.** auf **Window**)
s1SDelay	Relay1 Switch delay	Delays the switching of the relay when the limit value is exceeded. Range: 0,0...99,9 sec (only if **s1Funct.** is set to **Flow**)
s1RDelay	Relay1 Reset delay	Delays the switching of the relay when the limit value is undershot. Range: 0,0...99,9 sec (only if **s1Funct.** is set to **Flow**)
s1PA-Lim	Relay1 Part volume limit value	Limit value for monitoring the part volume counter. Reading is in the same units as the part volume unit (PA-Unit.) in counter menu group. (only if **s1Funct.** Is set to **GM Limit**)
s1TA-Lim	Relay1 Total volume limit value	Limit value for monitoring the total volume counter. Reading is in the same units as the total volume unit (TA-Unit) in counter menu group. (only if **s1Funct.** Is set to **TA Limit**)

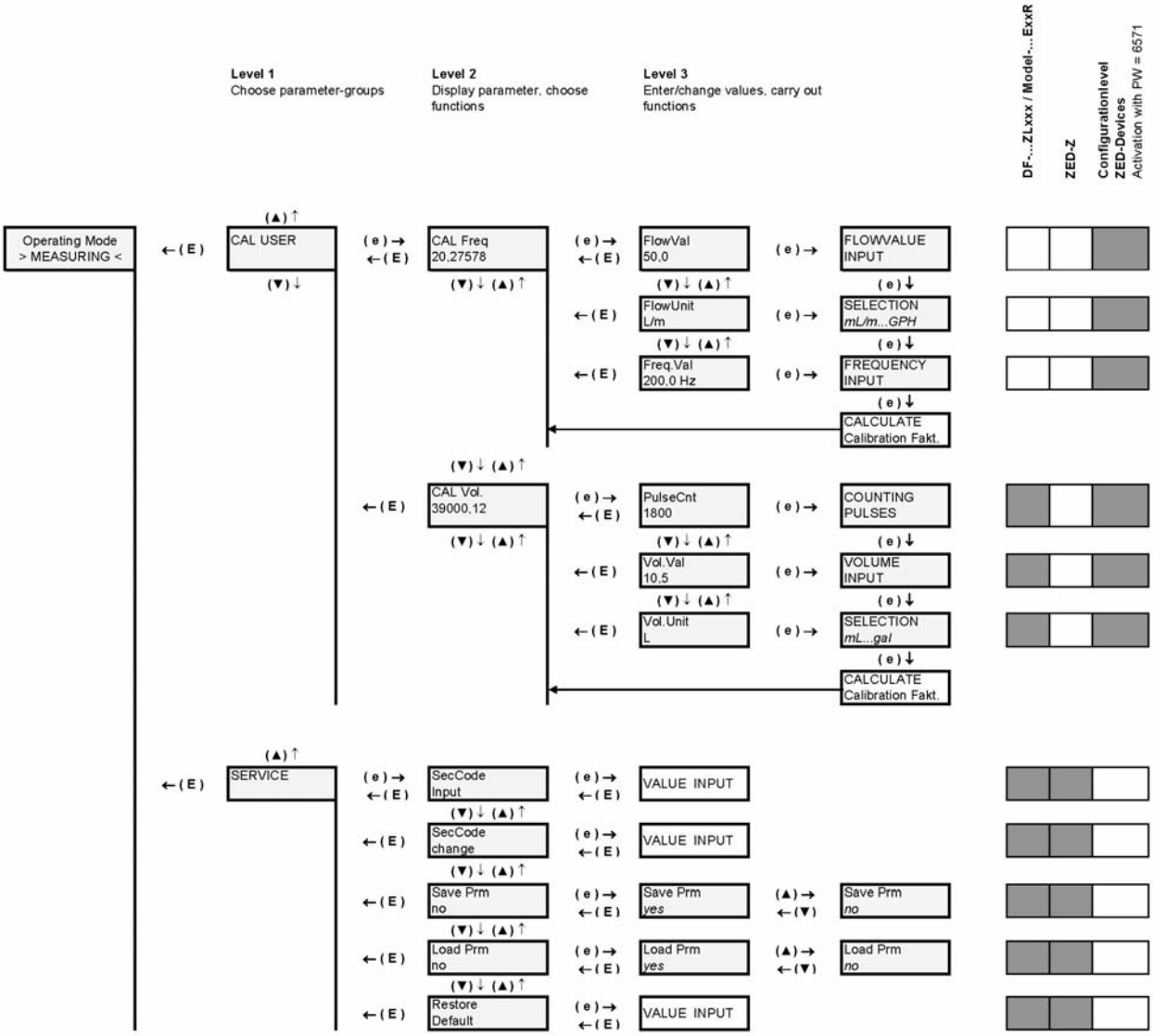
7.6 Relay 2 and volume counter



RELAY S2		
Menu Item	**Parameter / Function**	**Explanation / Values / Other**
s2Funct.	Relay2 Function selection	Flow : Monitoring of an adjustable flow value (s2SPoint). TA-Limit: Monitoring of an adjustable total volume (s2TA-Lim). PA-Limit: Monitoring of an adjustable part volume (s2PA-Lim). see → 8.0 Relay functions
s2Char.	Relay2 Switch characteristic	Limit: Monitoring a reading (s2SPoint). Window: Monitoring an adjustable measuring range (s2SPoint...s12punkt). (only if **s2Funct.** is set to **Flow**)
s2Logic	Relay2 Switch logic	normal: Relay 2 activated when the limit value is exceeded. invers: Relay 2 drops out when the limit value is exceeded.
s2SPoint	Relay2 Switchpoint	Reading is in the same units as the flow indicator. (only if **s2Funct.** is set to **Flow**)
s2Hyste	Relay2 Hysteresis	Reading is in the same units as the flow indicator. (only if **s2Funct.** is set to **Flow**)
s2FPoint	Relay2 Windowpoint	Reading is in the same units as the flow indicator. (only if **s2Funct.** is set to **Flow**)and **s2Char.** Is set to **Window**)
s2SDelay	Relay2 Switch delay	Delays the switching of the relay when the limit value is exceeded. Range: _0,0...99,9 sec (only if **s2Funct.** is set to **Flow**)
s2RDelay	Relay2 Reset delay	Delays the switching of the relay when the limit value is undershot. Range: _0,0...99,9 sec (only if **s2Funct.** is set to **Flow**)
s2PA-Lim	Relay2 Part volume limit value	Limit for monitoring the part volume counter. Reading is in the same units as the part volume units (PA-Unit.) in the counter menu group. (only if **s2Funct.** Is set to **PA-Limit**)
s2TA-Lim	Relay2 Total volume limit value	Limit for monitoring the total volume counter. Reading is in the same units as the total volume units (TA-Unit) in the counter menu group. (only if **s2Funct.** Is set to **TA-Limit**)

VOLUME COUNTER		
Menu Item	**Parameter / Function**	**Explanation / Values / Other**
PA-Unit.	Units on the part volume indicator	mL, L, m^3, gal, mgal, UU
PA =0?	Set part volume counter to 0	yes: Part volume counter is set to 0 no: No action
PA0dirct	0-setting option of the part volume counter released using the reset key	yes: Released (default) no: Blocked
TA-Unit	Measuring units on the total volume indicator	mL, L, m^3, gal, mgal, UU
TA =0?	Set total volume counter to 0	yes: Total volume counter is set to 0 no: No action

7.7 User alignment and Service-Settings



USER CALIBRATION	
Menu Item	**Function / Description**
CAL Freq*	Calibrate by entering frequency and flow. In the menu item **CAL Freq** the bottom line always shows the current pulse value of the User calibration. Calibration process: a) **FlowVal** Enter nominal flow value of the sensor. > (e) press > b) **FlowUnit** Enter unit for flow value. > (e) press > c) **Freq.Val.** Enter nominal frequency > finish with (e). The new pulse value of the User calibration is calculated from these three values and saved as user calibration for the flow measurement, e.g. 20.2757 pls./litre.
CAL Vol.	Calibration process using impulse counting and volume input (cc procedure). In the menu item **CAL Vol.** the bottom line always shows the current pulse value of the User calibration. Calibration process: a) **PulseCnt** measures number of impulses (e) press > start counter (impulses are counted) > (e) press > stops counter. b) **Vol.Val** Enter measured volume value > (e) press. c) **Vol.Unit** Enter unit for volume value > finish with (e). The pulse value of the User calibration is calculated from these three values and is saved as the user calibration for the flow measurement, e.g. 3900,5 pls./L.

*) CAL Freq – Only possible with ZED devices.

Note: With ZED devices it is necessary to enable the device-specific parameter input in the menu Item SecCode in the menu SERVICE in order to activate the USER-ABGLEICH function.

Note: If the new pulse ratio will be used for measurement, than the menu item fFaktor in the menu group General Settings must be setted to USER calibration.

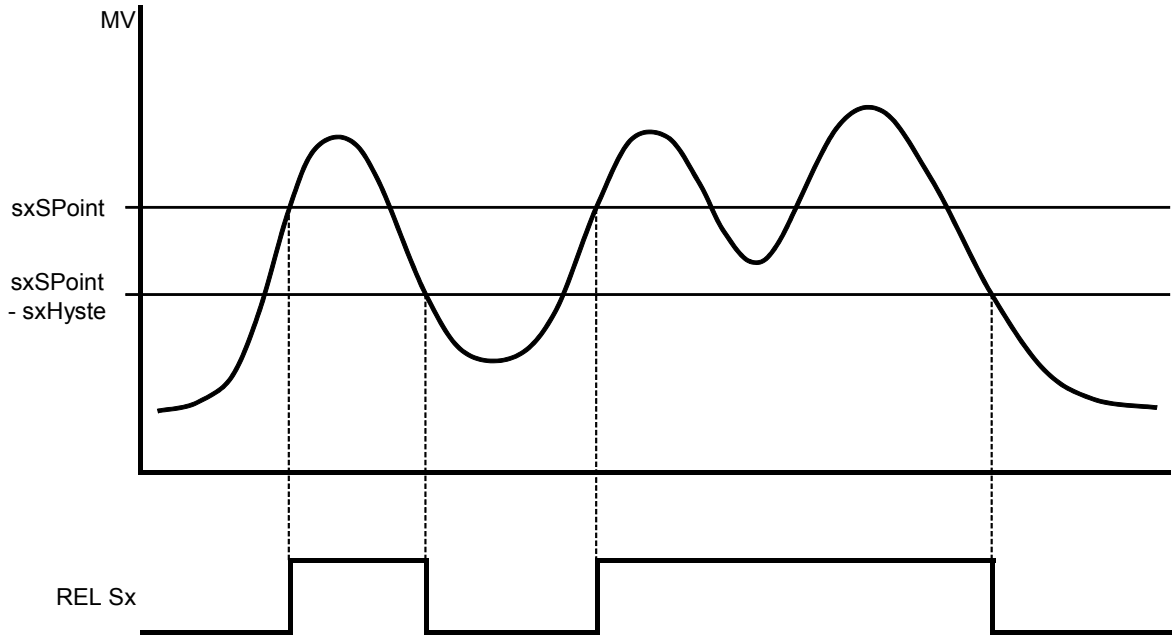
SERVICE		
Menu Item	**Function**	**Explanation / Values / Other**
SecCode Input	Enter security code	Input of 4-digit security code and enablement of the parameter change. The following passwords have been defined: 3461 – General menu release 6571 – Activates the device-specific parameters (only ZED und Model-devices)
SecCode change	Change security code	Define or change security code for the first time or change. If no code (= 0000) has been set, then the parameter values set are unsecured!
Save Prm	Save parameter record	Save current settings
Load Prm	Load parameter record	Restore saved settings (reload).
Restore Default	Reset to works default settings	Load initial setting with password 2541. The function is blocked when the sensor has been factory-calibrated (only Model-devices).

7.8 Error report

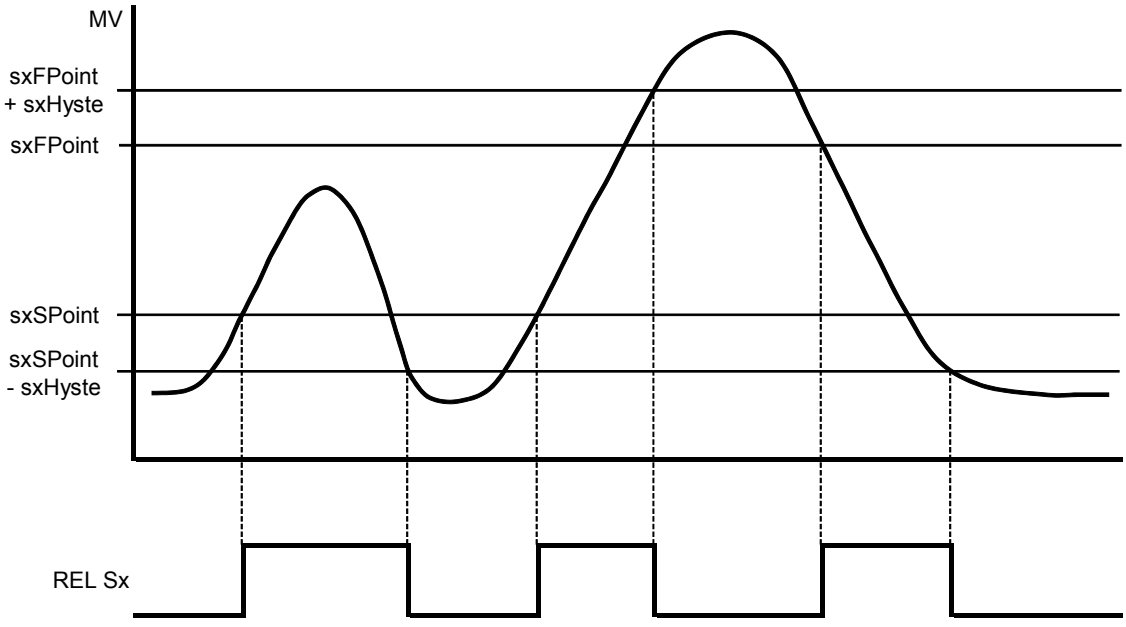
Error code	Reason	Reset
E102	UU User unit may not be ≤ 0	Correct parameter
E142	Distance between upper and lower analogue value too small (based on the actual flow)	Correct parameter
E143	Distance between upper and lower analogue value too small (based on the dosing amount)	Correct parameter
E 161	Value is greater than maximum measuring range value.	Correct parameter
E162	Hysteresis too large	Correct parameter
E 163	Window point is lower than switching point.	Correct parameter
E242	Frequency must be between 0,2 and 2000 Hz	Correct parameter
E245	Calculated pulse value out of valid range	Correct parameter
M100	Overflow	Acknowledge with PGM button
####	Value does not fit in the display	Choose suitable measuring unit

8. Relay Functions

8.1 Switching characteristic limit value



8.2 Switching characteristic window



9. Technical Information

Display:	2 x 8-digit alphanumeric, LCD module, illuminated
Display rate:	1 s^{-1}
Flow display:	3- or 4-digit (XX.X, X.XX or XXXX)
Flow units:	mL/s, mL/m, L/s, L/m, L/h, m^3/m, m^3/h, GPM, GPH, user unit per h/min/s selectable
Quantity meter:	8-digit
Quantity units:	mL, L, m^3, gal, mgal, user unit selectable
Measurement input:	0.2...2000 Hz (5...24 V_{DC}), TTL, PNP, NPN, Namur
Parameter input:	menu controlled, German or English
Parameter protection:	4-digit password
Control elements:	4 keys
Custom. comparison:	by entering the frequency and measured value Or in the Teach-In procedure (level calibration)
Control input:	reset function
Relay outputs:	2 x changer max. 250 $V_{AC/DC}$ max. 5 A / 1000 VA
Voltage supply:	24 V_{DC} ± 20 %, approx. 80 mA or 90...250 V_{AC} / max. 3 VA
Analogue output:	0(4)-20 mA Load: max. 500 Ω (300 Ω at AC-Supply) or 0-10 V (Load: > 100kΩ)
Apparent power:	15 V (at 24 V_{DC}) / max. 50 mA 12 V (AC-supply) / max. 50 mA
Ambient temp.:	-20...+70 °C
Dimensions:	96 x 96 x 109 mm (LxWxD) incl. screw clamp (control panel installation) 117 x 117 x 127 mm (LxWxD) (field casing)
Aperture size:	$92^{+0.8}$ x $92^{+0.8}$ mm (control panel installation)
Casing material:	fibreglass reinforced Noryl, (control panel installation) powder coated aluminium/PA 66 (field casing)
Protection type:	IP 40 on front clamp IP 00 (control panel installation) IP 65 (field casing)
Mounting:	mounting clip Form B (DIN 43 835) (control panel installation) wall and pipe mounting (field casing)
Connection:	plug-in terminal strip (control panel installation) cable connection (field casing)
Weight:	approx. 360 g (control panel installat.) approx. 1240 g (field casing)

10. Order Codes

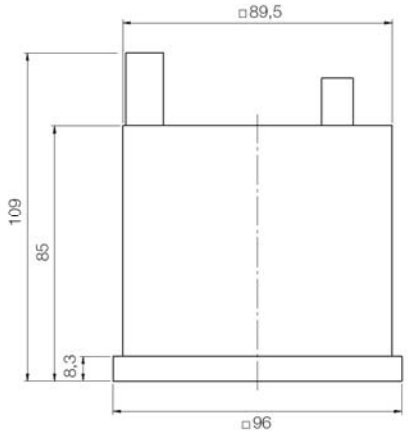
(Order example: **ZED-ZF10 KS 4R P**)

Supply	Model	Electrical connection	Analogue output	Casing
90-250 V_{AC}	**ZED-ZF10**	**KS** = terminal strip (control panel installation) **MS** = cable connection M 18 (Feldgehäuse)	**4R** = 0(A)-20 mA **1 R** = 0-10 V	**P** = control panel installation 96x96 mm **F** = field casing 116 x116 mm **S** = field casing with wall mount, infinitely variable pivotable **R** = field casing with pipe mounting
24 V_{DC}	**ZED-ZF13**			

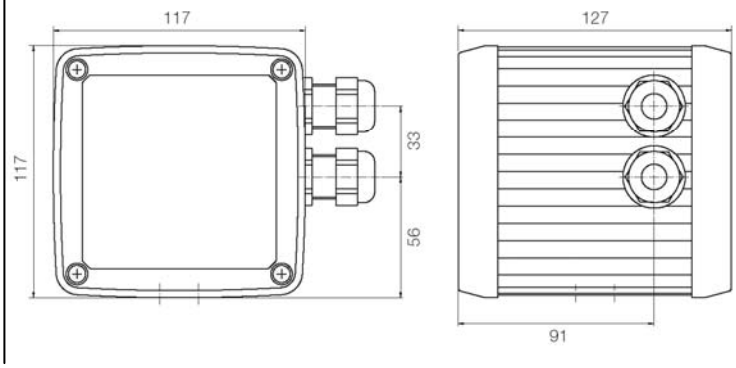
The order details of a ZED electronic in combination with a flow sensor can be found in the data sheet of the measuring device.

11. Dimensions

ZED-Z Control panel installation (casing P)



ZED-Z field housing



12. Declaration of Conformance

We, KOBOLD Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Counter Electronic Model: ZED-Z

to which this declaration relates is in conformity with the standards noted below:

EN 61326-1 2006-10
Electrical equipment for control and instrumentation technology and laboratory use – EMC-requirements (industrial area)

DIN EN 61010-1 2002-08
Safety requirements for electrical measuring-, control- and laboratory instruments.

EN 60529, DIN VDE 0470-1 1992-11
Protection type housing (IP-Code)

Also the following EWG guidelines are fulfilled:

2004/108 EC EMC Directive
2006/95 EC Low Voltage Directive

Hofheim, 12. Nov. 2007

H. Peters
General Manager

M. Wenzel
Proxy Holder

Operating Instructions

for

Flow Monitor

Model: DF-...Hxx3K
DF-...IHx3K
DF-...KLxxx
DF-...DLxxx
DF-...ZLxxx

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Manufactured and sold by:

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Fax: +49(0)6192-23398
E-Mail: info.de@kobold.com
Internet: www.kobold.com

2. Note

Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.
The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfil the EWG-machine guidelines.

PED 97/23/EG
In acc. with Article 3 Paragraph (3), "Sound Engineering Practice", of the PED 97/23/EC no CE mark.

	Pipe	
	Table 8 Group 1 dangerous fluids	Table 9 Group 2 no dangerous fluids
All DF-models except DF-xxG(H)R32 DF-xxG(H)R40	Art. 3, § 3	Art. 3, § 3
DF-xxGR32../DF-xxGR40	not deliverable	Art. 3, § 3
DF-xxHR32../DF-xxHR40..	Kat. II	Art. 3, § 3
DF-xxHF50..	Kat II	Art. 3, § 3

3. Instrument Inspection

Instruments are inspected before shipping and sent out in perfect condition.
Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

Scope of delivery:
The standard delivery includes:
- Sensor housing with mounted connection box or electronics
- Operating Instructions

4. Regulation Use

The units of model DF are used for measurement of liquid flow. Only low viscosity fluids which are chemically compatible with the materials used in the sensor housing are allowed to be measured. If using higher viscosity media, large measuring errors can occur. Long threads can lead to the seizure of the rotor. Likewise, ferritic particles can build up on the rotating vane and lead to faulty operation or destruction of the rotor. If in doubt, please contact the supplier.

Material Combinations

Standard version						**High-pressure version**	
Material combination	I	II	IIB[1)]	III	IV[1)]	VI[1)]	VII[1)]
Order code	**..A..**	**..B..**	**..C..**	**..D..**	**..E..**	**..G..**	**..H..**
Connection types	Pipe thread	Pipe thread	Pipe thread	Pipe thread	Pipe thread flange	Pipe thread	Pipe thread flange
Case	Trogamide	Polysulfone	Poly-propylene	Brass nickel-plated	St.St.[4)]	Brass nickel-plated	St.St.[4)]
Cover	Trogamide	Polysulfone	Poly-propylene	Polysulfone	Polysulfone	Brass nickel-plated	St.St.[4)]
Connection	Brass nickel-plated	St.St.[4)]	Poly-propylene	Brass nickel-plated	St.St.[4)]	Brass nickel-plated	St.St.[4)]
Locking pins	Brass	Brass	Brass	Brass	-	-	-
O-rings	NBR	FPM	FPM	NBR	FPM	NBR	FPM
Vane	POM	PTFE	PTFE	POM	PTFE	POM	PTFE
Axle[3)]	St.St.[4)]	St.St.[4)]	ceramics	St.St.[4)]	St.St.[4)]	St.St.[4)]	St.St.[4)]
Bearing[3)]	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE
Screen	PTFE[2)]	PTFE[2)]	PTFE[2)]	PTFE[2)]	PTFE[2)]	PTFE[2)]	PTFE[2)]
Max. operating pressure	10 bar	10 bar	6 bar	16 bar	16 bar	100 bar	100 bar flange PN 40
Max. operating temperature	60 °C	80 °C	80 °C	80 °C	80 °C	80 °C	80 °C

1) Connection cannot be rotated 2) St. St. for model DF 0.5 3) Special version upon request 4) St.St.1.4571

5. Operating Principle

KOBOLD measuring sensors are available with pipe thread or flange connections; standard or high-pressure versions are optional. The standard version is delivered with a standard front cover from solid, transparent plastic, which allows the flow to be optically inspected. The rotary motion of the shining red vane can be clearly seen. Faults such as power failure or rotor blockage can thus be quickly detected in situ. In addition to their use as measuring and monitoring systems, the devices can also be used as flow indicators.
The standard front cover is replaced by a metal plate on the high-pressure version (up to 100 bar with the threaded version). The devices can be installed in any position. However, the flow must always be in the direction of the arrow, and the front panel of the device must be arranged in the vertical plane. The fluidic housing must be full with liquid. Additional inlet or outlet pipes are not required. The large radial clearance between vane and housing wall renders the measuring sensor insensitive to dirt. Depending on the version, the connection fittings can be rotated and are bearing mounted. Switching electronics or vane front may be rotated at will for ease of viewing (while in service).

The KOBOLD measuring sensors are also available without a compact electronic. The linear flow proportional pulse signal provided by the sensor can be controlled by customer own electronics. The customer is able to integrate the sensor directly into the electronics with the OEM-version (implement EMC-immunity) and can therefore save costs and material.

6. Mechanical Connection

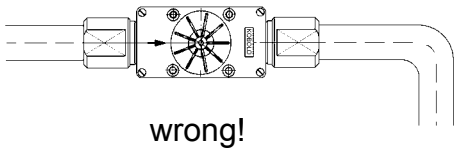
Before installation

- Please make sure that the actual flow throughput matches the flow range of the instrument. The flow range may be read from the label.

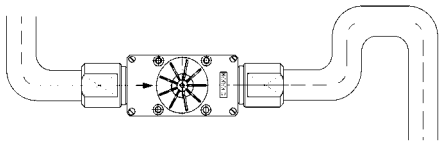
Warning! If the measuring range is exceeded by more than 20%, bearing damage may occur.

- Please make sure that the allowable maximum operating pressure and operating temperature of the instruments are not exceeded.
- Make sure that the electrical supply to the instrument conforms to the equipment operating data (see label).
- Remove all transport packing and make sure that no packing material is left in the instrument.
- The instrument may be installed in any position. However, the flow must always take place in the direction of the arrow, while the front face of the instrument must always be in the vertical plane.

- It must be ensured that the instrument housing is continuously filled with the flow medium, especially for flows from top to bottom. No straight runs are necessary at inlet and outlet.
- Sealing of the connection threads should be carried out with PTFE tape or similar.
- During installation of the instrument, it must be checked that no stress is applied to the connections. We recommend that the inlet and outlet pipes are mechanically fixed approximately 50 mm from each instrument connection.
- When using Material Combination V (PTFE) the instrument connections may not be rotated.
- Check that the connection thread to pipe is fully sealed.



wrong!



right!

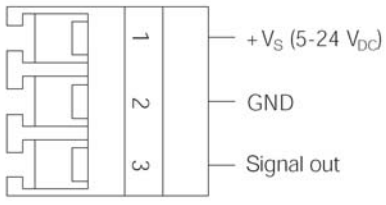
Warning! The threaded connections of the instrument must be tightened with a suitable sized open ended spanner. Otherwise, the housing may be stressed which could lead to breakage of the equipment.

7. Electrical Connection

7.1 DF-…Hxx3K, DF-…IHx3K

Attention! Make sure that the voltage value of your instrument is between 5 and 24 V_{DC}.

- Make sure that the supply wires are de-energised.
- Connect the 3-pole connection clamp in accordance with the wiring diagram.



Cable Connection

red = $+V_S$
blue = GND
yellow = Signal out

Attention! Incorrect wiring will lead to damage of the unit's electronics.

7.2 DF-…KLxxx, DF-…ZLxxx, DF-…DLxxx

Attention! Make sure that the voltage value of your instrument is 24 V_{DC}.

- Make sure that the supply wires are de-energised.
- Connect the wires in accordance with the wiring diagram.

Wire number	ZED-…KLxxx	ZED-…ZLxxx	ZED-…DLxxx
1	+24 V_{DC}	+24 V_{DC}	+24 V_{DC}
2	GND	GND	GND
3	4-20 mA	4-20 mA	4-20 mA
4	GND	GND	GND
5	d.c. *)	d.c. *)	Ctrl 1 *)
6	d.c. *)	Reset TM *)	Ctrl 2 *)
7	relay S1 N/O	relay S1 N/O	relay S1 N/O
8	relay S1 COM	relay S1 COM	relay S1 COM
9	relay S2 N/O	relay S2 N/O	relay S2 N/O
10	relay S2 COM	relay S2 COM	relay S2 COM

*) d.c. = Don't connect wire!
Reset TM = Reset part quantity
Ctrl 1 -- GND => Start
Ctrl 2 -- GND => Stop
Ctrl 1 -- Ctrl 2 -- GND => Reset dosage

Attention! Incorrect wiring will lead to damage of the unit's electronics.

8. Mechanical Commissioning

To avoid pressure surges, the flow medium should be slowly introduced into the instrument.

Attention! Pressure surges from solenoid valves, ball valves or similar may result in damage to the instrument (water hammer). In the operating condition it must be checked that the instrument housing is continuously filled with the flow medium.
Large air bubbles in the instrument housing can lead to measuring errors or destruction of the bearings.

9. Operation

DF-...KLxxx
See Operating Instructions ZED-K

DF-...ZLxxx
See Operating Instructions ZED-Z

DF-...DLxxx
See Operating Instructions ZED-D

10. Maintenance

The DF-..HN.. and DF-..HP.. instrument is maintenance-free for measured media without contamination,. Since the paddlewheel contains magnets, any ferritic particles present in the medium may lead to problems. In order to avoid such problems, we recommend the installation of a magnet filter (e.g. the magnet filter, model MF-R). Should cleaning of the instrument become necessary, the housing cover may easily be removed to provide access to the interior. Any work on the electronics may only be undertaken by the supplier; otherwise the warranty will become invalid.

11. Technical Information

Measuring accuracy:	2.5% of f. s.
Medium temperature:	-20 to +80 °C (0…60 °C Material Comb.: I)
Protection type:	IP 65

Frequency output (OEM) no CE (DF-...IHO3K, DF-...IHP3K)

Power supply:	5-24 V_{DC}
Supply current:	approx. 5 mA
Signal amplitude high:	approx. power supply
Signal amplitude low:	= 0.2 V
Output loss:	max. 2.5 mW
Electrical connection:	approx. 80 mm cable
Pulse output:	NPN, open collector, max. 15 mA, not symmetric

Frequency output (DF-...Hxx3K)

Power supply:	5-24 V_{DC}
Supply current:	approx. 5 mA
Signal amplitude high:	approx. power supply
Signal amplitude low:	= 0.2 V
Output loss:	max. 2.5 mW
Electrical connection:	PC-connection box with cable connection
Pulse output:	NPN or PNP, open collector, max. 15 mA, not symmetric
Special versions:	high temperature version, DIN-plug connection

K-Electronics

Display:	double-spaced display, illuminated flow value with selectable units and bargraph display
Power supply:	24 V_{DC} ±20 %
Current consumption:	approx. 100 mA
Electrical connection:	10 wire cable connection
Analogue output:	(0)4...20 mA selectable Load: 0...500 Ω or 0-10 V_{DC}, Load: >100 kΩ
Switching output:	2 relays, max. 30 V / 2 A
Control elements:	via 3 keys
Functions:	MIN/MAX memory, flow monitor, language settings, password protection

Counter-Electronics

Display:	2 x 8-digit LCD module, illuminated, total, part and flow quantity; units of measurement selectable
Quantity meter:	8-digit
Power supply:	24 V_{DC} ±20%
Current consumption:	approx. 100 mA
Electrical connection:	10-pole cable connection
Analogue output:	0(4)…20 mA selectable Load: 0…500 Ω or 0-10 V_{DC}, Load: >100 kΩ
Relay outputs:	2 relays, max. 30 V / 2 A
Control elements:	via 4 keys
Functions:	Reset, MIN/MAX-memory, flow monitor, monitoring of part and total quantities, language

Dosage-Electronics

Display:	2 x 8-digit LCD module, illuminated dosage, total and flow quantity, units of measurement are selectable
Quantity meter:	8-digit
Dosage:	5-digit
Power supply:	24 V_{DC} ±20 %
Current consumption:	approx. 100 mA
Electrical connection:	10-pole cable connection
Analogue output:	0(4)...20 mA selectable Load: 0...500 Ω or 0...10 VDC, Load >100 kΩ
Relay outputs:	2 relays, max. 30 V / 2 A
Control elements:	via 4 keys
Function:	dosage (relay S2), start, stop, reset, fine dosage, correction quantity, flow monitor, total volume monitoring, language

12. Ordering Codes

Flow rate L/min	Model	Material combination (see transducer)	Connection sizes IG or flange DIN 2527, PN40	Electronics	Power supply
0,08...0,5 0,2...1,4 0,2...2,5 0,3...2,6 0,4...5,0 0,25...6,0 0,5...12,0 1,00...12,5 1,00...24,0 2,00....48,0 2,5...60,0 5,00...120 40,0...160	**DF-05** **DF-14** **DF-25** **DF-26** **DF-50** **DF-06** **DF-12** **DF-13** **DF-24** **DF-48** **DF-60** **DF-H2** **DF-H6**	**A** = Trogamide/ brass **B** = PSO/ VA **C** = PP **D** = Brass **E** = St. St. **G** = Brass, 100 bar **H** = St. St., 100 bar	**R06** = G 1/8 **R08** = G 1/4 **R10** = G 3/8 **R15** = G 1/2 **R20** = G 3/4 **R25** = G 1 **R32** = G 1 1/4 **R40** = G 1 1/2 **F15** = DN 15 **F25** = DN 25 **F40** = DN 40 **F50** = DN 50	**KLK3=** Digital display, switching and analogue output, 24 V_{DC} 1.5 m cable connection **KLL3=** Digital display, switching and analogue output, 24 V_{DC} cable connection (Please specify length in clear text.) **ZLK3=** Counter electronic, digital display, 24 V_{DC}, 1.5 m cable connection **ZLL3=** Counter electronic, 24 V_{DC}, cable connection (Please specify length in clear text.) **DLK3=** Dosing electronics, 24 V_{DC}, 1.5 m cable connection **DLL3=** Dosing electronic, 24 V_{DC}, cable connection (Please specify length in clear text.)	**4=** (0)4-20 mA **1=** 0-10 V

* Flange connection for material combination stainless steel E or H only.

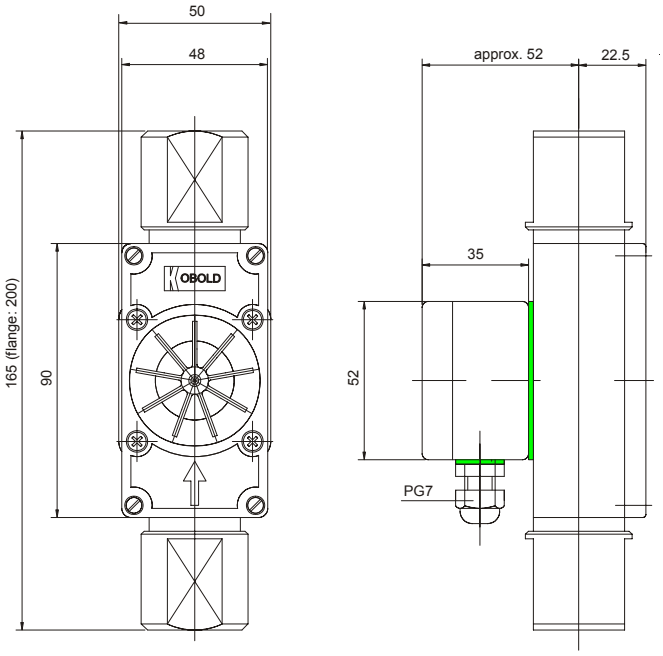
13. Recommended Spare Parts

Rotating vane	1.1) PTFE	1.2) POM	1.3) PTFE with saphire bearing
Axle / bearing	2.1) St. St./PTFE	2.2) Ceramic/PTFE	2.3) Saphire/Saphire (only for 1.3)
Cover for sensor housing	3.1) Trogamide	3.2) Polysulfone	
Cover for electronic housing.	4.1) NBR		
O-rings	5.1) NBR	5.2) FPM	

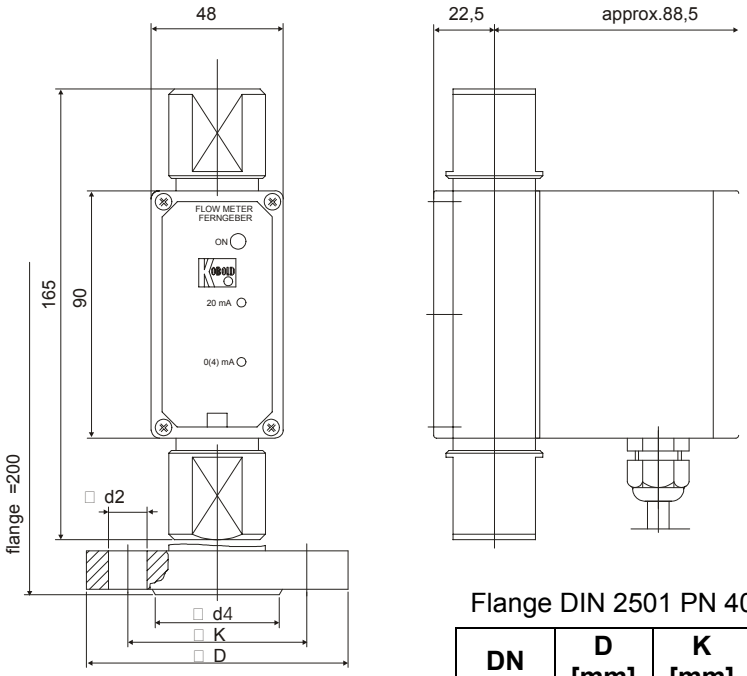
Please specify serial number when ordering spare parts.

14. Dimensions

14.1 DF-…IHx3K, DF-…Hxx3K



14.2 DF-…KLxxx, DF-…ZLxxx, DF-…DLxxx



Flange DIN 2501 PN 40

DN	D [mm]	K [mm]	d4 [mm]	d2 [mm]	Screw quantity
15	95	65	45	14	4
25	115	85	68	14	4
40	150	110	88	18	4
50	165	125	102	18	4

15. Declaration of Conformance

We, KOBOLD-Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Flow Transmitter Model: DF-..HN.. and DF-..HP..

to which this declaration relates in conformity with the standards noted below:

EN 61000-6-4 08-2002
Electromagnetic compatibility (EMC) - Emission standard for industrial environments

EN 61000-4-2 12-2001
Electromagnetic compatibility (EMC) - Testing and measurement techniques - Electrostatic discharge immunity test - Level 2

EN 61000-4-4 07-2005
Electromagnetic compatibility (EMC) - Testing and measurement techniques - Electrical fast transient/burst immunity test – Level 2

EN 61010 08-2002
Safety requirements for electrical equipment for measuring control and laboratory use

Also the following EWG guidelines are satisfied:
89/336 EWG
73/23 EWG

97/23/EC PED
Category II, Table 8, pipe, liquids
Group 1 dangerous fluids
Module D, mark CE0098
notified body: Germanischer Lloyd Germany

Hofheim, 13. June 2008

H. Peters
General Manager

M. Wenzel
Proxy Holder

We, KOBOLD-Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Flow Meter	**Model: DF-…KLxxx**
Flow Counter	**Model: DF-…ZLxxx**
Dosing Unit	**Model: DF-…DLxxx**

to which this declaration relates in conformity with the standards noted below:

EN 61326: 1997 +A1: 1998 +A2: 2001
Electrical equipment for measurement, control and laboratory use

- Noise immunity: according EN 61326/A1 Amendment A table A.1
  Criteria: according table 2, continuous not monitored operation
- Generic emission standard: according EN 61326/A1
  Limit values: according table 4, equipment of class B

DIN EN 61010-11 1993
Safety requirements for electrical equipment for measuring control and laboratory use

Also the following EEC guidelines are satisfied:

2004/108/EC	**EMC Directive**
2006/95/EC	**Low Voltage Directive**

97/23/EC PED
Category II, Table 8, pipe, liquids
Group 1 dangerous fluids
Module D, mark CE0098
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